NASA Procedural Requirements

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COMPLIANCE IS MANDATORY FOR NASA EMPLOYEES

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Request Notification of Change (NASA Only)

Subject: NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

Responsible Office: Office of Safety and Mission Assurance

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Appendix C. Test-Induced Damages

C.1 NASA conducts tests to better understand and mitigate complex design, manufacturing, or operational issues. The objective of testing is to provide NASA with confidence that the system meets its technical and programmatic requirements and can successfully and safely perform its mission in the operational environment. Some tests are designed and intended to result in hardware damage (e.g., a structural test-to-failure). Other tests are aggressive in nature, and test-incurred damage often occurs; the knowledge gained is used to improve designs. These instances of test damage would be reportable NASA mishaps if the failure or damage was associated with procedural errors or with a non-compliance to design or construction requirements, or if test-incurred damage caused harm to personnel or to uninvolved equipment, facilities, or property.

C.2 For the purposes of mishap determination, development tests are not missions nor are development test objectives mission objectives, nor commercial off-the-shelf acceptance tests conducted by contractor on equipment not accepted by the government, unless specifically defined as such in the program, project, or mission pre-mishap plan.

C.3 Where public, Government, or private property is located within a military test range, and the risk to such property is formally approved and accepted by the range authority as part of the test approval process, NASA may support and accept the mishap classification, reporting, and investigation completed by the outside authority (the Federal agency authorized to investigate the military range) as described in section 3.1.7.

C.4 The signed document describing the risk of potential test-induced damage outcomes includes the test team's best understanding of the uncertainties in environments, test limits, or system performance.

C.5 Examples of test-induced damage incidents that may be accepted prior to testing in a test plan or related document include the following:

a. Structural damage resulting from planned structural tests-to-yield when performance between yield and ultimate failure is uncertain.

b. Unplanned but acceptable limited erosion of a flame trench during launch or engine firing.

c. Thermal damage to brakes and tires during a maximum braking test.

d. Thermal, blast, or erosion damage to cables and other normally exposed equipment on a launch pad or in an explosive chamber.

e. Excessive splashdown structural damage to a recoverable booster when new parachute performance is

uncertain.

f. Loss of test hardware as a result of known, accepted deficiencies in the test or test support system (e.g., planned use of off-the-shelf, low-reliability sounding rockets for low-cost suborbital tests).

g. Crash damage to an small Unmanned Aircraft System (sUAS) airplane as a result of known and accepted controller handling quality limitations.

h. Damage sustained to unmanned aircraft when used for risk reduction flights to test systems of manned aircraft.

i. Damage resulting from one or more of the following:

(1) Acknowledged limitations in pre-test analysis or models or uncertainties in analysis, model, or environmental predictions.

(2) Planned test operations in known and approved hazardous environmental conditions. Purposefully testing in an organizational environment where NASA, by formal choice, does not control hazards (i.e., Space Act or international agreements where NASA cedes design, operational risk management, or both to the partner).

C.6 Examples of test-related damage normally not "accepted risks," and, therefore, would be candidates for mishap categorization include these:

a. Damage as a result of human error in test setup or conduct when relevant human performance is not part of the test objectives.

b. Damage as a result of standard test planning or test design not done in accordance with Agency, Center, or Program requirements.

c. Damage to the test article resulting from test facility malfunction during a test.

d. Damage as a result of test facility software malfunction when relevant software performance is not part of the test objectives.

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